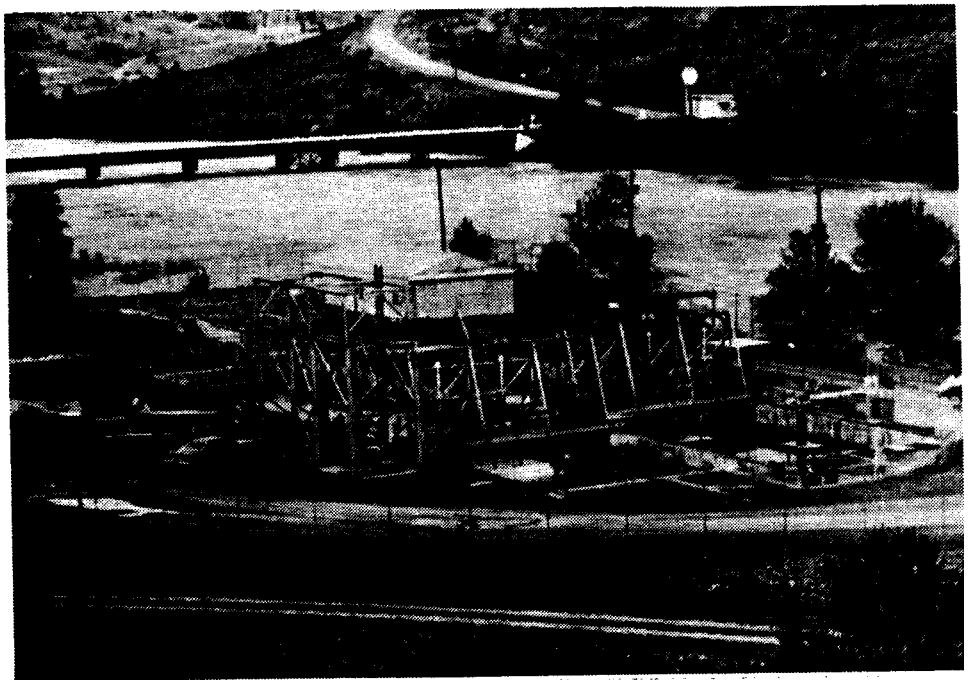
OXBOW FISH HATCHERY

1990 Spring Chinook Brood Year Report
1991 Steelhead Brood Year Report



by

Brent R. Snider, Fish Hatchery Superintendent I

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ABSTRACT

For the 1991 brood year, 1,151 steelhead trout Oncorhynchus mykiss were trapped at the Hells Canyon Dam fish trap. During the fall of 1990, 602 steelhead trout were trapped, while 549 steelhead trout were trapped in the spring of 1991. We spawned 570 female steelhead trout which produced 3,116,947 green eggs. Survival to eye-up was 57.2% for a total of 1,781,427 eyed eggs, which were shipped to Niagara Springs and Magic Valley hatcheries.

The 1990 brood year spring chinook salmon Oncorhynchus tshawytscha trapping resulted in the capture of 30 fish. These fish were all transferred to Lookingglass Hatchery in Oregon for spawning.

Author:

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Fish Hatchery Superintendent I

INTRODUCTION

Oxbow Fish Hatchery is part of the Idaho Power Company's hatchery system and has been in operation since 1962. The Oxbow facility is owned and funded by Idaho Power Company (IPC) and operated by the Idaho Department of Fish and Game (IDFG). The hatchery is located on the Oregon shore of the Snake River at mile marker 270, approximately 1/4 mile below IPC's Oxbow Hydroelectric Plant (602 river miles from the Pacific Ocean). Oxbow Hatchery is a steelhead trout Oncorhynchus mykiss and spring chinook salmon Oncorhynchus tshawytscha adult holding and egg taking station.

OBJECTIVES

The primary purpose of Oxbow Hatchery is to trap enough returning adult steelhead trout and spring chinook salmon to meet the Hells Canyon mitigation requirements for adult anadromous fish returns on the Upper Snake River. The mitigation goal is to produce 1.3 million eyed steelhead trout eggs for rearing at Niagara Springs Fish Hatchery. All returning adult spring chinook salmon are trapped and then transferred to another fish hatchery for spawning.

FACILITY DESCRIPTION

Oxbow Hatchery consists of a main hatchery building, four adult holding ponds, an off-station fish trap, and a single family residence. The facility has six cinderblock raceways that have exceeded their usefulness.

The hatchery building is a 28-ft x 60-ft single-story metal structure partitioned into two main rooms. Half of the building consists of shop space, office space, and sleeping quarters; while the other half is for egg incubation. Two 8-ft square sheds attached to the main building provide storage.

The incubation room has the capacity to eye-up 2 million eggs. The 28 incubation stacks provide the hatchery with 224 incubation trays (FAL and Heath trays).

Adult holding and production facilities include four holding ponds, a fish trap, and a fish transport truck. The four holding ponds are actually two large ponds separated into four. The two larger divisions each measure 105 ft x 30 ft x 5 ft deep providing 31,500 cubic feet of holding area. The two smaller divisions measure 55 ft x 30 ft x 5 ft deep providing 16,500 cubic feet of holding space. Two electric crowding racks provide the ability to consolidate the fish for handling. The production facilities consist of two recently-repaired raceways that provide 3,400 cubic feet of rearing space. Four additional raceways could provide an additional 6,800 cubic feet of rearing space after reparations. The adult fish trap consists of an attraction pool, a fish ladder, two weirs, a fish trap, and a loading hopper. The fish are removed from the trap when the loading hopper is hoisted the 80 feet to the fish transport truck. The fish truck is a 1981 GMC 2.5-ton 10-wheeled truck with a bed-mounted 1,000-gallon fish tank. Up to 100 fish are then transported the 23 miles to Oxbow Hatchery.

The new, single-family residence was completed in the fall of 1991. This house has three bedrooms, two baths, a two-car garage, and ample storage. The old trailer, which previously served as manager's housing, was transferred back to Idaho Power for use and relocated to the Brownlee Trailer Court.

RECOMMENDATIONS

The present incubation system's use of raw river water has proven to be detrimental to the ability of this facility to produce the desired quantity and quality of steelhead eggs. The primary need for the continued operation of this facility should be to provide for a high-quality disease-free water source for egg incubation. I recommend that well water be provided to meet this need.

Another priority should be the renovation of the hatchery building. The incubation room needs waterproof paneling, adequate lighting, a heat source, and additional electrical outlets. The office space needs to be enlarged and arranged to provide a view of the fish holding ponds. The dormitory needs major renovation as it currently is inappropriate for temporary employee housing.

Another consideration should be further evaluation of the rearing of fall chinook salmon. This facility has a mitigation goal to produce 1,000,000 fall chinook smolts.

WATER SUPPLY

The Snake River provides the water for hatchery operations. A pumping platform adjacent to the hatchery holds four production pumps. Two production pumps (100-hp each) produce 20 cfs, and two incubation pumps (5-hp each) produce another 0.5 cfs. Only one 100-horsepower pump and one 5-horsepower pump operate at any given time. The other two act as auxiliary pumps and have a separate power source. Water temperatures range from a winter's low of 33°F to a late summer's high of 77°F (Figure 1). Water from the production pumps passes through two aeration pump platforms before entering the four holding ponds. Incubation water enters an elevated surge tank in the hatchery building before distribution through a 4-inch PVC water line to the 14 incubator stacks.

STAFFING

Oxbow Hatchery is staffed by one permanent Hatchery Superintendent I. Two temporary Bio-aide positions share the 1,240 hours budgeted for extra help.

1991 BROODYEAR STEELHEAD TROUT

FISH PRODUCTION

Total steelhead trout trapped for the 1991 brood year was 1,151 fish (458 males; 693 females). Fall steelhead trout trapping began on October 24, 1990 and ended on December 17, 1990 capturing 602 steelhead trout. Trapping occurred five days a week. The trap operated for 770 hours in the fall for a trapping efficiency of 1.3 hours per fish. Spring trapping started on March 27, 1991 and ended on April 30, 1991. Total spring trap operation hours were 819 with 549 steelhead trout trapped (Figure 2). Total fish per trap operation hours in the spring was 1.5 hours per fish. No trapping occurred on the weekends.

The adults returning to the Hells Canyon Trap in 1990 and 1991 were from smolt releases in 1988 and 1989. The 1988 spring release was 735,500 smolts. The 1989 release was split between a fall release of 947,200 smolts and a spring release of 351,400 smolts (1,298,600 smolts for 1989).

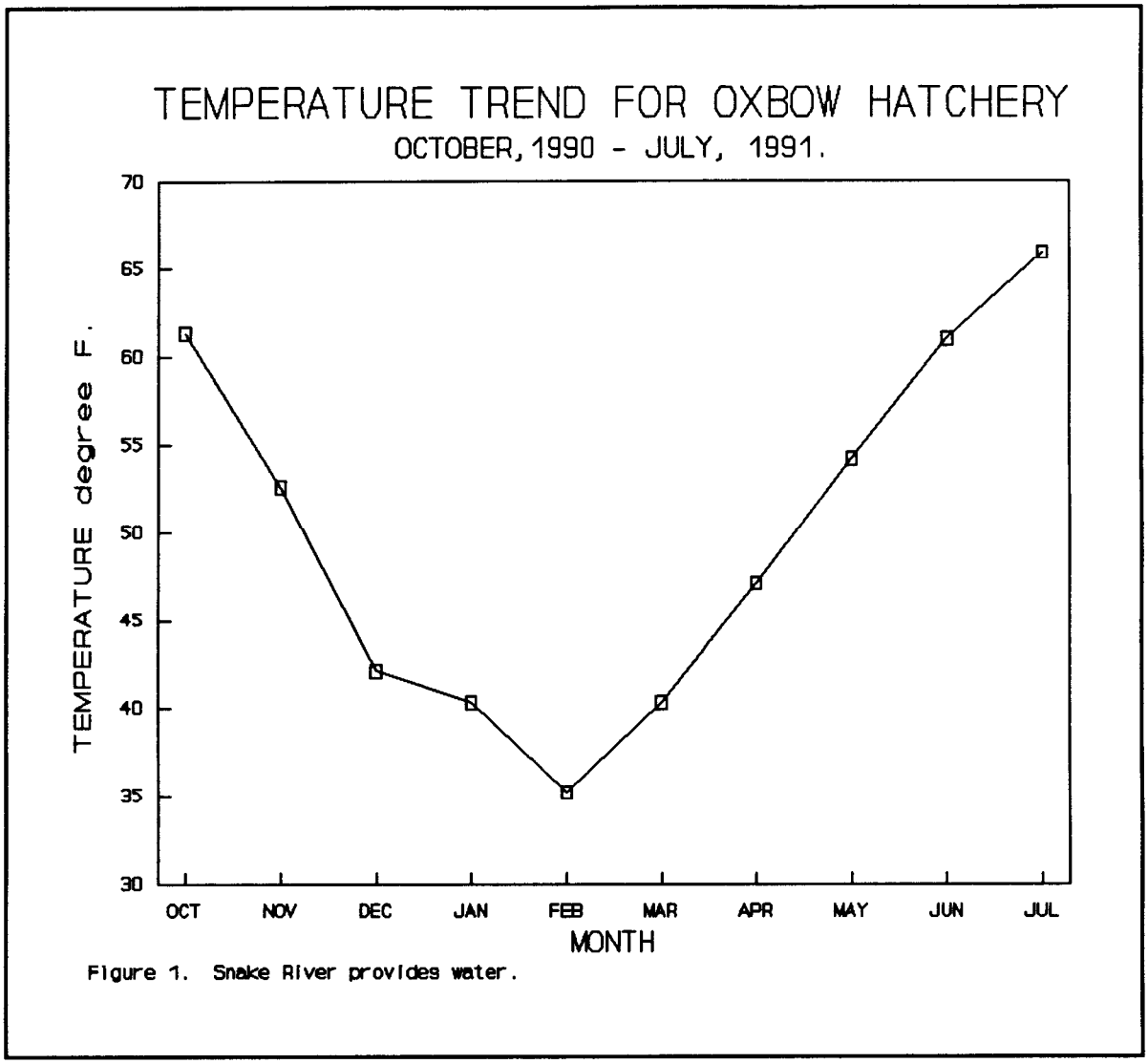

Figure 1. Snake River provides water.

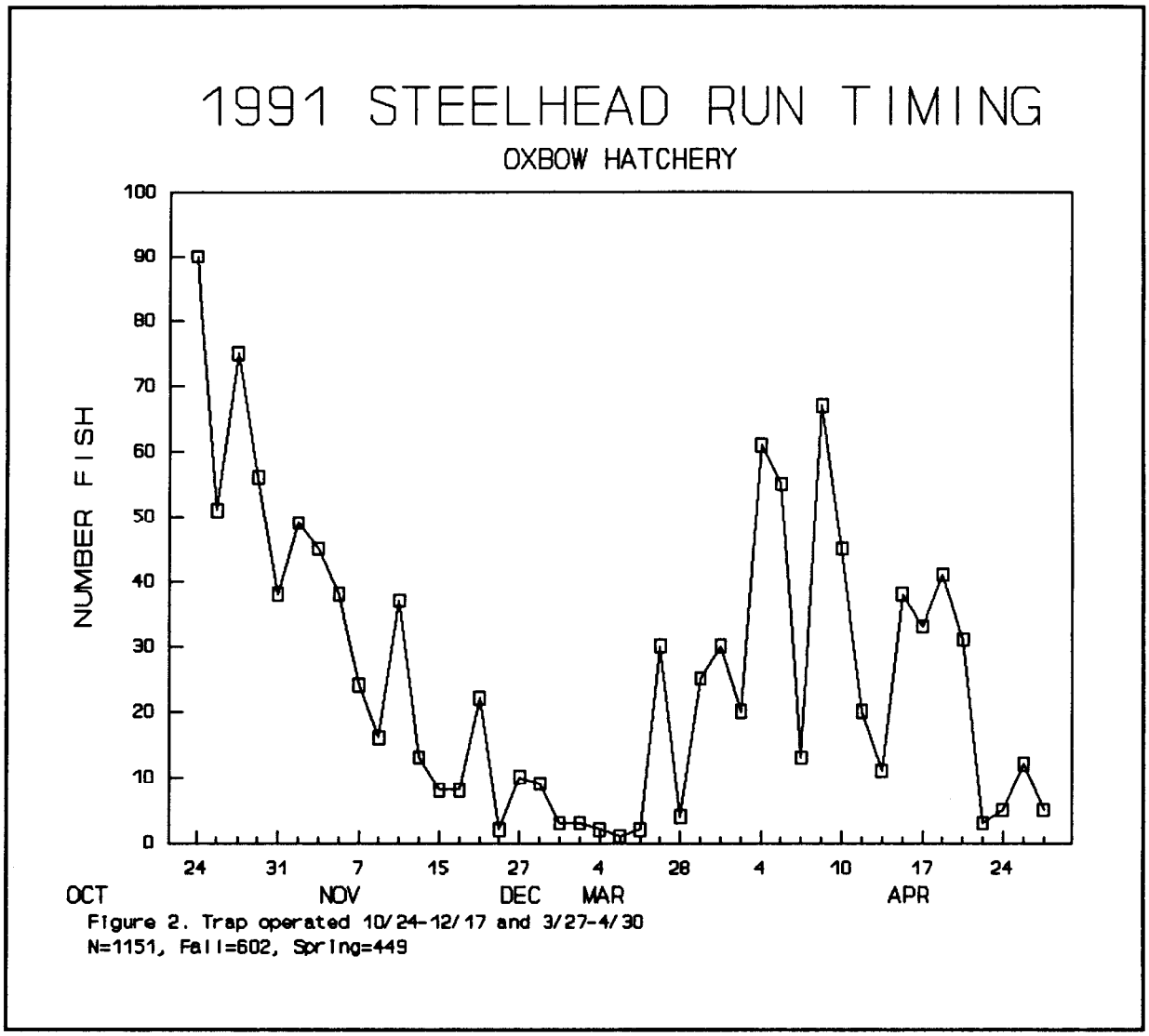

Figure 2. Trap operated 10/24-12/17 and 3/27-4/30
N=1151, Fall=602, Spring=449

Length frequencies were collected on 1,131 steelhead trout; 20 fish were not measured. The measurements were of fork lengths to the nearest centimeter. The one-ocean contingent was 624 steelhead trout (308 females; 316 males), while the two-ocean contingent was 507 steelhead trout (376 females; 131 males) (Figure 3). Criteria used to separate year classes was males less than 68 cm and females less than 65 cm denoting one-ocean.

TAG RECOVERY

This brood year, 12 steelhead trout were trapped with external tags. These tags origins were Oregon Fish and Wildlife (3 floy tags), Washington Fish and Wildlife (5 floy tags), and 4 National Marine Fisheries Service jaw tags.

Adult fish were empirically examined to determine "wild" from hatchery fish. The presence and condition of all fins was the criteria used to differentiate "wild" from hatchery. "Wild" fish would be those having perfect or nearly perfect fins, while those fish with any missing, eroded, or deformed fins were interpreted as hatchery fish. Of the 1,151 steelhead trapped, 28 or 2.4% were interpreted as meeting this definition of "wild".

PRESPAWNING MORTALITY

Prespawning mortality was 46 steelhead trout (4.0%). Prespawning mortalities included the female fish that died prior to spawning and those male fish that died before the second spawning week.

SPAWNING OPERATIONS

Spawning operations began on March 22 and ended on April 30, 1991. A total of 570 females were spawned for a green egg total of 3,116,947, for an average of 5,468 eggs per female. Fecundity was calculated with an electronic eyed-egg counter. Eleven female steelhead trout were killed, but their eggs were discarded due to apparent fish health problems.

Females were dry-spawned using the incision method. Eggs were collected in a colander to drain the ovarian fluid. Eggs from two females were placed into a spawning bucket and fertilized with sperm from two or three males. The fertilized eggs were allowed to stand in two cups of well water for two to five minutes, then rinsed once with well water. Fertilized eggs were water-hardened with 100 ppm buffered Argentyne for one hour.

INCUBATION

Eggs from each spawning bucket were placed into an incubator tray; approximately 8,000 to 10,000 eggs (1,000-1,500 mis) per tray. Incubation water flows were set at 4.8 to 5.0 gpm. River incubation water ranged from a low of 38°F to a high of 59°F, while well incubation water was a constant 52°F. After 48 hours of incubation eggs were treated with 1,667 ppm formalin in a 15 minute drip. Treatments were on an every-other-day regime until water temperatures reached 50°F, after which treatments were administered every day.

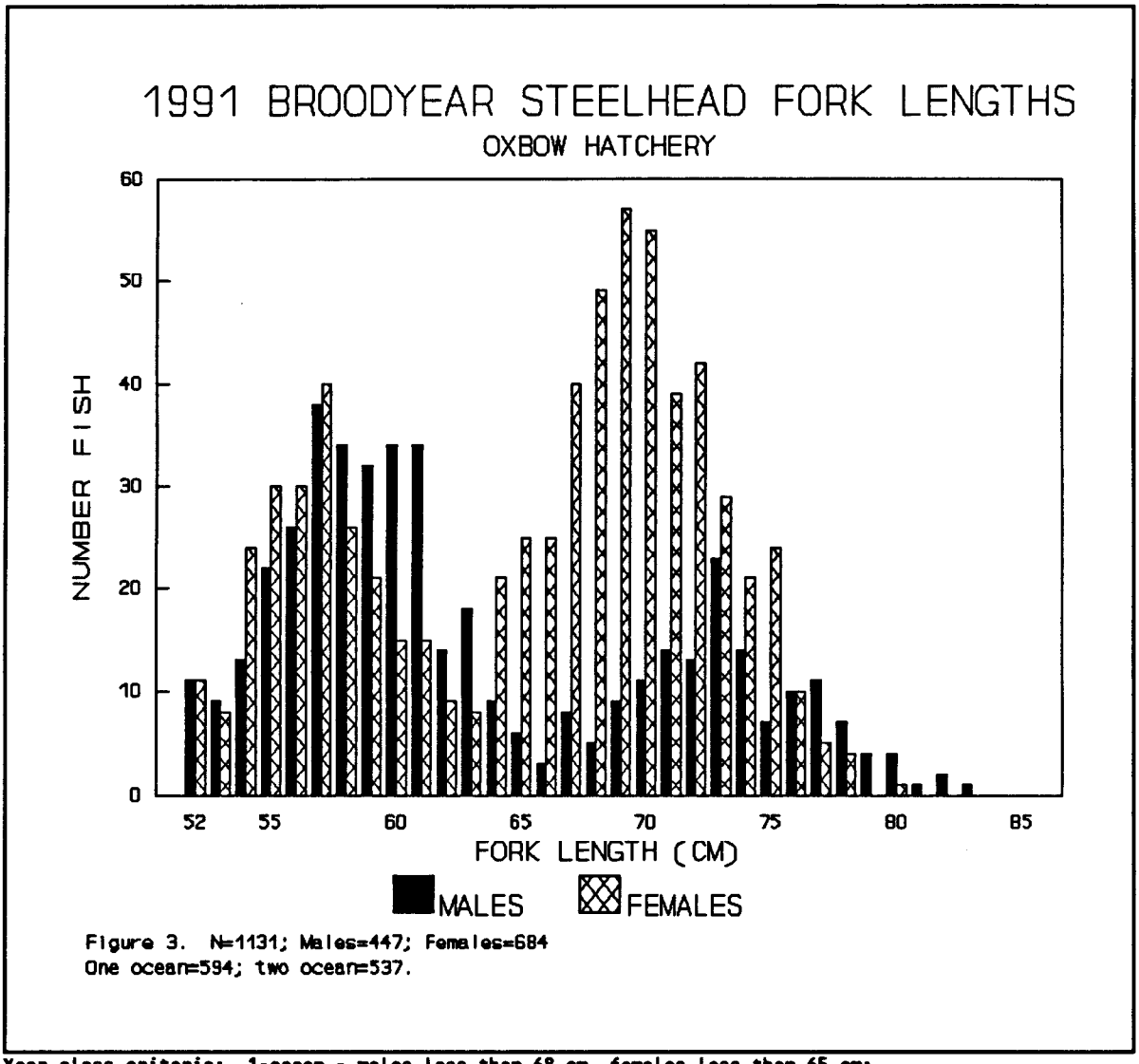

Figure 3. N=1131; Males=447; Females=684
One ocean=594; two ocean=537.

Year class criteria: 1-ocean - males less than 68 cm, females less than 65 cm;
2-ocean - males 68 cm or larger, females 65 cm or larger.

Eye-up occurred at 330 temperature units. Eye-up percentages for all lots was 57.2%, producing 1,781,427 eyed eggs. This season egg lots were split for incubation in either well water (52°F) or river water. The domestic well was plumbed to three incubation stacks for test rearing. Well water eggs eyed-up at 76.3%, while river water eggs eyed-up at 35.4%. Oxbow eggs incubated at Pahsimeroi Hatchery eyed-up at 61.8% (Table 1). A Jensorter egg-sorter with electronic counter was used to determine egg numbers.

Table 1. Total eye-up percentages for well vs. river water at Oxbow Hatchery for the 1991 brood ear.

GREEN EGGS			EYED EGGS		PERCENT EYE-UP		
TOTAL	RIVER	WELL	RIVER	WELL	RIVER	WELL	TOTAL
78,397	53,271	25,666	0	15,534	0.0	60.5	19.7
81,432	30,659	50,773	0	35,775	0.0	70.5	43.9
274,104	126,684	147,420	46,248	90,720	36.5	61.5	50.0
291,428	45,360	246,068	18,673	189,000	41.2	76.8	71.3
251,428	251,428	0	117,560	0	46.8		46.8
164,376	164,376	0	67,394	0	41.0		41.0
589,464	294,840	294,624	81,520	141,034	27.6	47.8	37.8
309,243	121,303	187,940	54,200	182,328	44.7	97.0	76.5
408,218	0	408,218	0	256,000		62.7	62.7
345,517	0	345,517	0	250,678		72.6	72.6
151,800	0	151,800	0	129,042		85.0	85.0
171,000	0	171,000	0	105,721		61.8	61.8
3,116,947	1,087,921	2,029,026	385,595	1,395,832	35.4	68.8	57.2
PAHSIMEROI		1,048,359		647,712		61.8	61.8
OXBOW	1,087,921	980,667	385,595	748,120	35.4	76.3	54.8

EGG SHIPMENTS

Eggs were shipped to Pahsimeroi, Magic Valley, and Niagara Springs fish hatcheries (Table 2). Pahsimeroi Fish Hatchery received 1,048,359 green eggs. These green eggs were air-freighted on the spawn collection day in egg tubes packed within insulated coolers. Magic Valley Fish Hatchery received 1,074,739 eyed eggs (802,686 direct from Oxbow; 272,053 indirectly from Pahsimeroi). Niagara Springs Fish Hatchery received 929,242 eyed eggs (472,063 direct from Oxbow; 457,179 indirectly from Pahsimeroi). These indirect shipments were of eggs originally collected at Oxbow. Eyed eggs were shipped in iced well water in insulated coolers.

FISH HEALTH

Oxbow Hatchery depends on the Snake River as the source for all water requirements. This water has a very high silt content, an unacceptable Ph (8.5), high nitrates, and various other pollutants (including arsenic). Plans are to replace the river water with well water for egg incubation.

Due to the length of holding of the steelhead, prespawning mortality can be a serious problem. Oxytetracycline injections have proven to be effective in limiting fish losses. Overwintering steelhead were inoculated twice with Oxytetracycline; once in early winter and again in early spring.

Table 2. Summary of 1991 Hells Canyon steelhead egg transfers spawned at Oxbow Hatchery.

Shipping station	Eyed eggs	Green eggs	Receiving station
Oxbow	472,063	0	Niagara Springs
Oxbow	802,686	0	Magic Valley
Oxbow	0	1,048,359	Pahsimeroi
Pahsimeroi	272,053	0	Magic Valley
Pahsimeroi	457,179	0	Niagara Springs
Totals	1,074,739	1,048,359	2,123,098

The 1991 brood year steelhead trout were disease sampled for various tests, including virus, bacterial kidney disease, and various bacteria. Positive results were found with the tests for infectious pancreatic necrosis virus, infectious hematopoietic necrosis virus, Aeromonas hydroohila and Salmoncola sp., a copepod (Table 3).

STEELHEAD SMOLT RELEASES

The 1991 brood year steelhead trout smolt releases were carried out in the spring of 1992. In all, 660,964 steelhead smolts (127,842 pounds) were released into the Snake River below Hells Canyon Dam.

Table 3. Results of fish health samples 1991 brood year Hells Canyon ateelhead.

BROOD SAMPLES

LOG #	STOCK	DATE	DATA
90-275	HC STA	10/26/90	BLOOD TESTS RUN; 0/2 PC,2/2 SALMONCOLA SP.
90-294	HC STA	11/19/90	PC:0/1, BK:O/1 1/1BC(LOW) 1/1 A. HYDROPHILA (MODERATE); 0/1 VIRO
91-52	HC STA	3/13/91	PC: 0/3
91-69	HC STA	4/2/91	BK: 0/1, PC:0/2, VIRO 0/52
91-81	HC STA	4/5/91	BK:0/44, PC: 0/20, PW: 0/20; VIRO: 0/44 OF, 0/21 MALE KS
91-86	HC STA	4/9/91	VIRO 0/47
91-100	HC STA	4/12/91	VIRO: 0/166 OF, 6/67 MALE TISSUES VP+
91-106	HC STA	4/19/91	VE: 0/56, VIRO 1/144 MALE VP+
91-118	HC STA	4/24/91	1/30 OF VH+, 0/31 OF, 1/31 VP+ (MALE)
91-119	HC STA	4/26/91	VIRO 0/16, BK: 0/16
91-131	HC STA	5/1/91	NO RESULTS

1990 SPRING CHINOOK SALMON

SPRING CHINOOK TRAPPING

Adults returning to the Hells Canyon Trap in 1990 were from smolt releases in 1987, 1988, and 1989 (Table 4). Spring chinook trapping began on May 24 and ended on July 13, 1990 for a total of 37 trapping days. In May, 25 fish were trapped and 5 fish in June for a total of 30 fish. No fish were trapped in July. Total fish trapped per day was 0.81. Fork lengths to the nearest cm were recorded on all trapped chinook salmon (Figure 4).

Spring chinook trapped in 1990 were shipped to Lookingglass Hatchery in Oregon. Fish transport was from Oxbow Hatchery to Lookingglass Hatchery. At Oxbow Hatchery, 33 grams of MS 222 and 750 pounds of ice were added to the fish transport truck to reduce fish stress and fish tank water temperature during transport. Upon arrival at Lookingglass Hatchery, the fish were treated with formalin before being released into the holding ponds.

A total of 16 females were spawned with 13 males for an approximate egg take of 60,000 green eggs (3,750 eggs per female). There was one mortality prior to spawning. Spawned eggs were combined with the general egg take at Lookingglass Hatchery.

CHINOOK SMOLT RELEASES

Broodyear 1990 chinook smolt releases were conducted in the spring of 1992. These smolts were reared at Rapid River Hatchery. A total of 500,500 smolts (24,655 pounds) were released into the Snake River below Hells Canyon Dam.

CARCASS DISPOSITION

All fish carcasses were checked for clips, tags, and signs of bacteria and other diseases by hatchery employees before burial at the Halfway Landfill.

Table 4. Oxbow Hatchery spring chinook salmon returns by smolt releases, 1990.

Release year	Number smolts released	1990 returns by release year	Previous returns
1987	103,000	9	66
1988	400,600	21	3
1989	500,000	0	0
Totals	1,003,600	30	

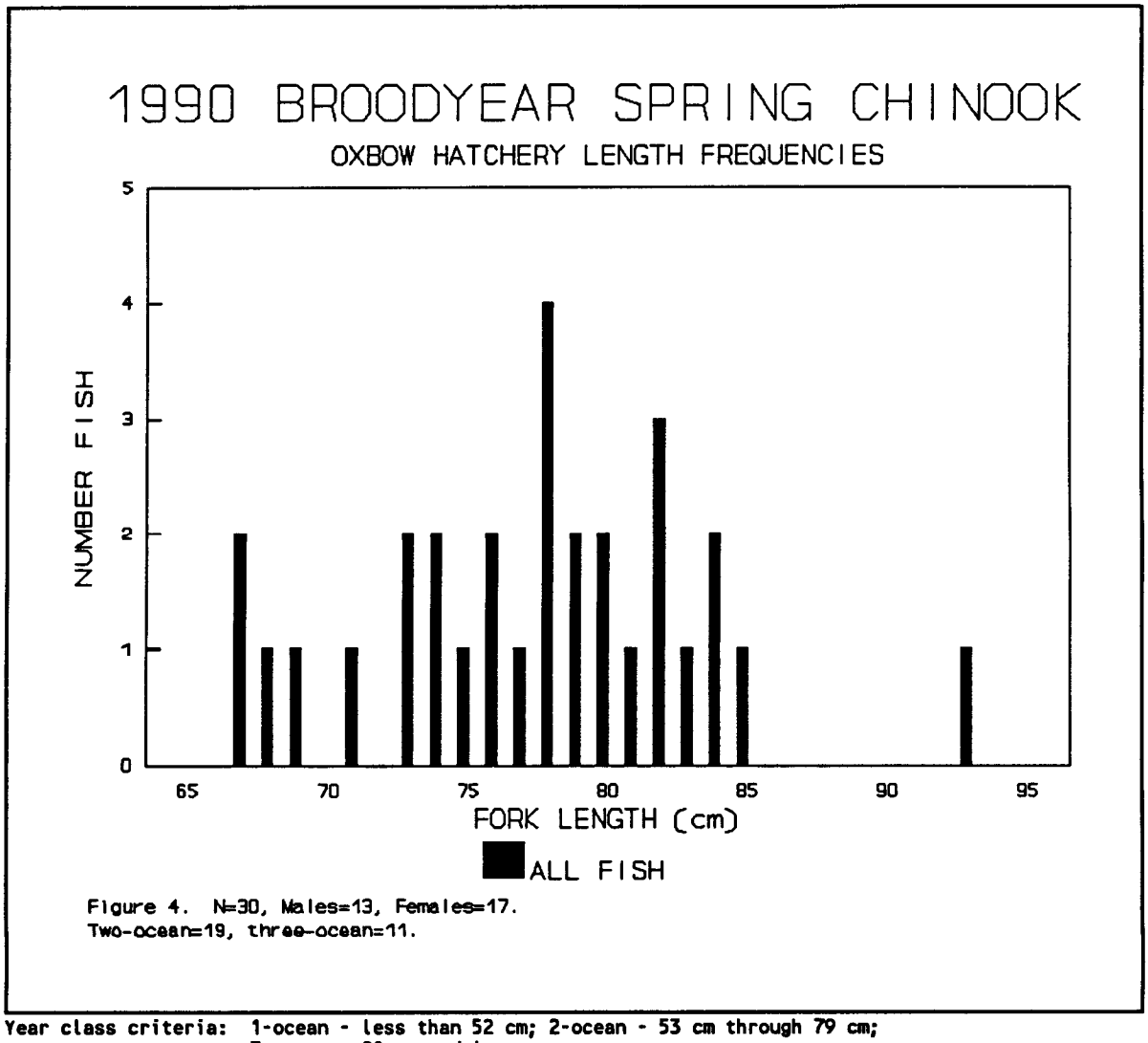

Figure 4. N=30, Males=13, Females=17.
Two-ocean=19, three-ocean=11.

Year class criteria: 1-ocean - less than 52 cm; 2-ocean - 53 cm through 79 cm;
3-ocean - 80 cm and larger.

A P P E N D I X

Appendix A. Temperature trend for Oxbow Hatchery from October, 1990, through July, 1991.

Month	Averaae Temperature
OCT	61.3
NOV	52.6
DEC	42.1
JAN	40.3
FEB	35.2
MAR	40.3
APR	47.1
MAY	54.2
JUN	61
JUL	65.9

Appendix B. Oxbow Hatchery run timing 1991 steelhead.

Month	Date	Number
OCT	24	90
	25	51
	25	75
	30	56
	31	38
NOV	1	49
	2	45
	6	38
	7	24
	8	16
	9	37
	14	13
	15	8
	16.	8
	22	22
	23	2
	27	10
	28	9
	29	3
	30	3
DEC	4	2
	1	1
	11	2
MARCH	27	30
	28	4
	29	25
APRIL	2	30
	3	20
	4	61
	5	55
	8	13
	9	67
	10	45
	11	20
	12	11
	16	38
	17	33
	18	41
	19	31
	23	3
	24	5
	25	12
	26	5

Appendix C. Fork length (cm) frequencies for spawned steelhead at Oxbow Hatchery, 1991. Twenty fish trapped but not measured.

Length	Male	Female
52	11	11
53	9	8
54	13	24
55	22	30
56	26	30
57	38	30
58	34	26
59	32	21
60	34	15
61	34	15
62	14	9
63	18	8
64	9	21
65	6	25
66	3	25
67	8	40
68	5	49
69	9	57
70	11	55
71	14	39
72	13	42
73	23	29
74	14	21
75	7	24
76	10	10
77	11	5
78	7	4
79	4	0
80	4	1
81	1	0
82	2	0
83	1	0
Totals	447	684

Total fish 1,131

Number fish	Males	Females	Total
One ocean	311	283	594
Two ocean	136	401	537
Total	447	684	1,131

	Mean length
One ocean	58.51
Two ocean	70.80
Combined	64.34

Year class criteria:
1-ocean - males less than 68 cm, females 65 cm and less;
2-ocean - males 68 cm and larger, females 66 cm and larger.

Appendix D. Fork lengths of spring chinook trapped at Hell's Canyon Fish Trap, 1990.

Length (cm)	Males	Females	Jacks	2-ocean	3-ocean	Total
65						
66			0	19	11	30
67	1	1				
68	1					
69		1				
70						
71		1				
72						
73	1	1				
74		2				
75		1				
76	1	1				
77	1					
78		4				
79	1	1				
80	1	1				
81	1					
82	2	1				
83	1					
84	1	1				
85	1					
86						
87						
88						
89						
90						
91						
92						
93	1					
94						
95						
Totals	13	17				
Total fish		30				

Appendix E. Water quality lab results.

Analysis	Results	Date analyzed
Alkalinity	154.0	05/09/91
Ammonia as N	0.09	05/07/91
Arsenic	0.0058	04/29/91
Chloride	23.8	05/02/91
Copper	<0.01	04/30/91
Fecal Coliform	<5	05/01/91
Hardness	167.0	04/29/91
Mercury	<0.0005	05/16/91
Nitrate as N	0.84	05/02/91
Nitrite as N	<0.5	05/02/91
Phosphate, Total	0.15	05/06/91
Settleable Solids (ml/1)	0.3	04/29/91
Sulphate	46.4	05/02/91
Suspended Solids	15.0	04/30/91
Total Dissolved Solids	320.0	05/03/91
pH (SU)	8.50	05/01/91
Fecal Strep	<5	05/01/91

Chemistry analysis as mg/1
Bacteria as organisms/100 ml

Submitted by:

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IDAHO DEPARTMENT OF FISH AND GAME

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